REMARKS

This Amendment is responsive to the Office Action dated August 24, 2005. Applicant has amended claim 12. Claims 1-44 remain pending.

Claim Rejections Under 35 U.S.C. § 112

In the Office Action, the Examiner rejected claims 10 and 35 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner stated that claims 10 and 35 are indefinite insofar as they fail to further limit the claimed invention relative to the respective base claims.

Applicant traverses these rejections. Claims 10 and 35 both require the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine to be *copies* of such data. Thus, these claims are further limiting insofar as the respective base claims do not require the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine to be *copies*. Withdrawal of the rejections under 35 U.S.C. § 112, second paragraph is courteously solicited.

Claim Rejections Under 35 U.S.C. § 101

In the Office Action, the Examiner rejected claims 12-16 under 35 U.S.C. § 101 because the claimed invention is not supported by either a specific asserted utility or a well established utility. In response to this rejection, Applicant has clarified claim 12 to further specify that the computer-readable medium has data structures therein that control forwarding of packets by a network device. This should obviate any utility concerns that the Examiner may have under 35 U.S.C. § 101. In particular, the specific recitation in claim 12 that the data structures control forwarding of packets by a network device is sufficient to meet the utility requirement of 35 U.S.C. § 101.

Applicant notes that claims 12-16 were not rejected by the Examiner for any other reasons. Therefore, insofar as the rejections under 35 U.S.C. § 101 have been overcome, these claims should be in condition for immediate allowance.

Claim Rejections Under 35 U.S.C. §§ 102, 103

In the Office Action, the Examiner rejected claims 1, 6-9, 11, 17, 20-21, 24-28, 31-34, 36-38 and 41-44 under 35 U.S.C. § 102(e) as being anticipated by Cain (USPN 6,857,026); and rejected claims 2-5, 18-19, 22-23, 29-30 and 39-40 under 35 U.S.C. § 103(a) as being unpatentable over Cain in view of Aramaki et al. (USPN 6,618,760) (hereafter Aramaki).

Applicant traverses all of these rejections. Cain fails to disclose each and every feature of the claimed invention, and provides no teaching that would have suggested the desirability of modification to include such features. Furthermore, Aramaki provides no teaching that remedies the clear deficiencies of Cain relative to the features recited in Applicant's claims.

It appears that the Examiner may have misinterpreted the teaching of Cain and/or overlooked various features of Applicant's claims. All pending claims require the use of "indirect next hop data" that associates network routes with a *common* portion of next hop data. That is, the network routes are resolved to indirect next hop data, which then maps to *common portions* (i.e., shared portions) of next hop data. Thus, routes can be resolved to respective indirect next data, but the respective indirect next hops points to next hop data that is shared for multiple routes. As outlined in Applicant's specification, the use of indirect next hop data pointing to common portions (shared) next hop data can improve network routing by simplifying router updates in response to network events.

For example, rather than resolving network routes directly to next hops, the invention described in Applicant's specification teaches route resolution to map network routes to "indirect next hops," which in turn map to the next hop data. In accordance with the invention, the next hop data can be changed, e.g., in response to a network event, without requiring supplemental route resolution or recalculation of the network routes. Instead, the next hop data can simply be changed in the next hop data to account for the network event without requiring any changes to the indirect next hop data or any new resolution of network routes. Since nodes in a routing tree may border on hundreds or thousands or even millions, use of common next hop data and indirect next hop data to avoid updating individual nodes can realize significant performance improvements.

Independent claim 1 recites a method comprising storing route data representing routes within a computer network, storing next hop data representing network devices neighboring a

network router, and storing indirect next hop data that maps at least a subset of the routes represented by the route data to a common portion of the next hop data.

Independent claim 12 recites a computer-readable medium having data structures therein that control forwarding of packets by a network device comprising a first data structure to store route data representing destinations within a computer network, a second data structure to store next hop data representing interfaces to neighboring network devices, and a set of data structures to store indirect next hop data that map at least a subset of the route data to a common portion of the next hop data.

Independent claim 17 recites a router comprising a computer-readable medium to store (i) route data representing routes within a computer network, (ii) next hop data representing neighboring network devices, and (iii) indirect next hop data that maps at least a subset of route data to a common portion of the next hop data.

Independent claim 24 recites a router comprising a routing engine to store routing information representing a topology of a network, and a packet forwarding engine to store packet forwarding information in accordance with the routing information, the packet forwarding information including (i) route data representing destinations within a computer network, (ii) next hop data representing interfaces to neighboring network devices, and (iii) indirect next hop data that maps a subset of the routes represented by the route data to a common portion of the next hop data.

Independent claim 28 recites a computer-readable medium having instruction therein for causing a programmable processor within a router to store route data representing routes within a computer network, store next hop data representing network devices neighboring a network router, and store indirect next hop data that maps at least a subset of the routes represented by the route data to a common portion of the next hop data.

Independent claim 37 recites a method comprising routing packets within a network using indirect next hop data that associates a plurality of routes with a common portion of next hop data.

In the Office Action, the Examiner analyzed independent claim 1 in detail. The Examiner indicated that independent claims 17, 24, 28 and 37 were rejected based on the same rationale set forth with respect to claim 1. Unfortunately, however, the rationale set forth in the rejection of

claim 1 is based on a misinterpretation of Cain. For example, contrary to the Examiner's analysis, Cain fails to disclose or suggest "indirect next hop data" that associates network routes with a common portion of next hop data. For this reason, all rejections under 35 U.S.C. § 102 are improper.

Furthermore, Aramaki provides no teaching that remedies the clear deficiencies of Cain relative to the features recited in Applicant's claims. For this reason, all rejections under 35 U.S.C. § 103 are also improper. Applicant notes, again, that independent claim 12 was not rejected under either 35 U.S.C. § 102 or 35 U.S.C. § 103, so this claim is not being addressed further.

In the analysis of claim 1, the Examiner cited column 3, lines 50-63 and column 4, lines 12-19 and lines 42-56 of Cain as disclosing the storing of route data representing routes within a computer network. The Examiner also cited column 4, lines 12-19 and 42-56 as disclosing the storing of next hop data representing network devices neighboring a network router. The Examiner then cited column 3, lines 50-63 and column 4, lines 12-19 and lines 42-56 of Cain as disclosing the storing of indirect next hop data that maps at least a subset of the routes represented by the route data to a *common portion* of the next hop data. The Examiner rejected claim 1 based on these passages of Cain.

The three passages of Cain cited by the Examiner in the rejection of claim 1 are copied below in their respective entireties. In particular, the passage at column 3, lines 50-63 of Cain indicates:

> Because the routing table includes multiple routes for the destination, the node needs to select a route from among the routes in the routing table. Essentially, the node needs to find in the routing table the highest priority route that is available for routing protocol messages to the destination. Thus, the node must differentiate between routes having different priorities, and may need to determine whether particular routes are available or unavailable.
>
> When prioritizing routes or selecting a route from among the routes in the routing table, it is preferably for the node to ensure that any route used for routing protocol messages does not create a forwarding loop. The node typically uses a routing algorithm to verify that a particular route does not create a forwarding loop.

Clearly, this passage at column 3, lines 50-63, of Cain fails to disclose or suggest "indirect next hop data" that associates network routes with a common portion of next hop data, as required by claim 1. In particular, this passage describes nothing more than selection of a route from a routing table, and indicates that preferably, a route should be used that does not create a forwarding loop. Nothing in this passage describes next hop data and separate indirect next hop data that that associates network routes with a *common portion* of the next hop data.

The next passage of Cain cited by the Examiner, column 4, lines 12-19, provides that:

> Each node determines various routes to the other nodes in the communication network, assigns a relative priority to each route, and installs at least a preferred route and an alternate route in its routing table. For example, Node A (102) may determine that there are four (4) possible routes to Node D (108), namely routes ABD, ACD, ABCD, and ACBD, by running multiple routing protocols, by computing multiple routes, through manual configuration of routes, or by some other means. Node A (102) then assigns a relative

This passage of Cain also fails to disclose or suggest "indirect next hop data" that associates network routes with a common portion of next hop data. Instead, this passage of Cain describes how multiple routes can be defined between nodes within a network, and how a preferred route and an alternative route can be installed. Neither of the preferred route or the alternative route,

however, make use of indirect next hop data that associates the routes with a *common portion* of next hop data, i.e., next hop data that is shared between the routes.

The final passage of Cain cited by the Examiner in the analysis of claim 1, column 4, lines 42-56, provides:

> It is beneficial, then, to prioritize the routes such that the preferred route and the alternate route are associated with different next-hop devices and are supported over different network interfaces. It may be insufficient to prioritize the routes such that the preferred route and the alternate route are associated with different next-hop devices but are supported over the same network interface (for example, via a point-to-multipoint communication link). Likewise, it may be insufficient to prioritize the routes such that the preferred route and the alternate route are associated with the same next-hop device but are supported over different network interfaces (for example, via separate communication links). The selection of a robust alternate route is particularly important when only two routes (i.e., a preferred route and an alternate route) are installed in the routing table.

This passage of Cain also fails to disclose or suggest "indirect next hop data" that associates network routes with a common portion of next hop data. Instead, like the passage at column 4, lines 12-19, this passage of Cain discusses preferred and alternative routes. In particular, this passage describes the importance of associating the preferred route and alternative routes with different next-hop devices. Again, however, neither the preferred route nor the alternative route, make use of indirect next hop data that associates the routes with a common portion of next hop data.

In order to support an anticipation rejection under 35 U.S.C. § 102(b), it is well established that a prior art reference must disclose each and every element of a claim. This well known rule of law is commonly referred to as the "all-elements rule."[1] If a prior art reference fails to disclose any element of a claim, then rejection under 35 U.S.C. § 102(b) is improper. [2]

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[1] *See Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 USPQ 81 (CAFC 1986) ("it is axiomatic that for prior art to anticipate under 102 it has to meet every element of the claimed invention").

[2] *Id. See also Lewmar Marine, Inc. v. Barient, Inc.* 827 F.2d 744, 3 USPQ2d 1766 (CAFC 1987); *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (CAFC 1990); *C.R. Bard, Inc. v. MP Systems, Inc.*, 157 F.3d 1340, 48 USPQ2d 1225

In this case, Cain fails to disclose each and every limitation set forth in Applicant's independent claims insofar as Cain fails to disclose or suggest indirect next hop data that associates the routes with a common portion of next hop data. Therefore, the rejections under 35 U.S.C. § 102(b) are improper and must be withdrawn.

Furthermore, the rejections under 35 U.S.C. § 103 are also deficient for the same reason. In any case, Applicant notes that the Aramaki reference provides no teaching that would remedy the clear deficiencies of Cain relative to the features recited in Applicant's claims. Aramaki appears to describe a packet forwarding scheme that uses sets of routing tables to represent entries of a radix tree. Nothing in Aramaki, however, discloses or suggests "indirect next hop data" that associates network routes with a common portion of next hop data, as required by Applicant's claims.

Applicant reserves further comment at this time with regard to the dependent claims, but Applicant does not acquiesce to any of the Examiner's interpretations of the Aramaki reference nor the propriety of any of the current rejections.

(CAFC 1998); *Oney v. Ratliff*, 182 F.3d 893, 51 USPQ2d 1697 (CAFC 1999); *Apple Computer, Inc. v. Articulate Systems, Inc.*, 234 F.3d 14, 57 USPQ2d 1057 (CAFC 2000).

CONCLUSION

In view of the claim amendments set forth in the attached Listing of Claims, and the forgoing comments, Applicant respectfully submits that all claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date: 11/23/05

SHUMAKER & SIEFFERT, P.A.
8425 Seasons Parkway, Suite 105
St. Paul, Minnesota 55125
Telephone: 651.735.1100
Facsimile: 651.735.1102

By: Kent J. Sieffert

Name: Kent J. Sieffert
Reg. No.: 41,312